

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9310	2	71-9310	USA/9310/B(U)-96	1	OF 3

**2. PREAMBLE**

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

**3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION**

- a. ISSUED TO (*Name and Address*)  
MDS Nordion  
447 March Road  
Ottawa, ON K2K 1X8  
Canada
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION  
MDS Nordion application dated May 27, 2003, as supplemented.

**4. CONDITIONS**

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

**5.****(a) Packaging**

- (1) Model No. F-431 Transport Package
- (2) Description

The Model No. F-431 Transport Package is designed to transport Cesium-137 in either special form or RAMCO-50 non-special form sealed sources. The F-431 Transport Package consist of: (1) the overpack which provides impact and thermal protection; (2) either the MDS Nordion Gammacell-1000 irradiator (GC-1000), or the MDS Nordion Gammacell-3000 irradiator (GC-3000) which provides shielding protection; and (3) the radioactive contents in either special form or RAMCO-50 non-special form sealed sources which provides containment.

The F-431 Transport Package is a stainless steel cylindrical package with a 1,067-millimeter (mm) (42-inch (in.)) outside diameter and a height of 1,283 mm (50.5 in.) that is placed on a removable mild steel skid. The maximum weight of the package is 2,270 kilograms (kg) (5000 pounds (lb)).

The overpack consists of nested cylindrical shells. The shells are made from stainless steel and the volume between the shells is filled with rigid foam. This foam provides insulation during an accidental fire. Vent holes, plugged with material designed to melt in a fire, are provided between the shells to prevent pressure buildup and allow a pathway for escape of gases from foam during an accidental fire.

The GC-1000 and the GC-3000 are lead-shielding casks each with a source cavity. The package contents may consists of up to eight cesium-137 special form sealed sources or RAMCO-50 non-special form sealed sources (provided Condition 5.(b)(1)(ii) is met) inside a source holder, within the source cavity. The maximum total activity of cesium-137 is 113

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9310	2	71-9310	USA/9310/B(U)-96	2 OF	3

5.(a)(2) continued

tera-Becquerels (TBq)(3,050 Curies (Ci)). The following are the features of the GC-1000 and GC-3000:

Irradiator Model	Rated Capacity	Diameter*	Height*	Lead Thickness*	Steel Shell Thickness*	Weight*
GC-1000	113 TBq (3,050 Ci)	457 mm (18 in.)	610 mm (24 in.)	150 mm (6 in.)	9.5 mm (0.375 in.)	1,035 kg (2,280 lb)
GC-3000	113 TBq (3,050 Ci)	457 mm (18 in.)	610 mm (24 in.)	110 mm (4.3 in.)	9.5 mm (0.375 in.)	1,035 kg (2,280 lb)

\* Nominal Values

The approximate dimensions and weights of the package are as follows:

Package outside diameter	1,067mm (42 inches)
Package height	1,283 mm (50.5 inches)
Cavity diameter	559 mm (22 inches)
Cavity height	813 mm (32 inches)
Removable skid	1,118 mm (44 inches) x 1,003 mm (39.5 inches) x 203 mm (8 inches)
Overpack weight	1044 kg (2300 lbs)
Contents weight (max.)	1226 kg (2700 lbs)
Maximum package weight	2,270 kg (5000 lbs)

## (3) Drawings

The packaging is constructed in accordance with the MDS Nordion drawing F643101-001, Sheet 1, Revision F and Sheet 2, Revision B.

## (b) Contents

## (1) Type and form of material

- (i) Cesium-137 as a sealed source which meets the requirements of special form radioactive material. The sealed sources consist of the following special form sources: C-378, C-1000, C-1001, C-3000, C-3001, or ISO-1000.
- (ii) Cesium-137 as the RAMCO-50 non-special form sealed source, provided the following conditions are met:
  - Source must conform to the specifications given in Figure 4.8 of the Safety Analysis Report and sealed source registry Certificate No. NR-0880-S-804-S.
  - Source must have been shown to not be leaking within six months prior to shipment.

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9310	2	71-9310	USA/9310/B(U)-96	3	OF 3

5.(b) continued

- Source must not have been damaged during its service in the GC-1000.

(2) Maximum quantity of material per package

113 TBq (3,050) Curies.

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.
- (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12, until October 1, 2004, and under provisions of 10 CFR 71.17 thereafter.

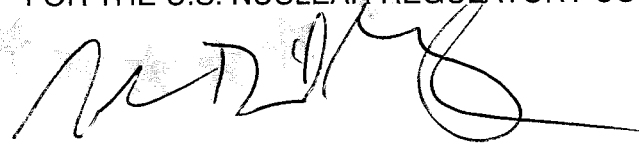
8. Expiration date: June 30, 2009.

**REFERENCES**

MDS Nordion application dated May 27, 2003.

Supplements dated: April 16, July 16, July 21, and July 23, 2004.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



John D. Monninger, Chief  
Licensing Section  
Spent Fuel Project Office  
Office of Nuclear Material Safety  
and Safeguards

Date July 27, 2004



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

**SAFETY EVALUATION REPORT**

Docket No. 71-9310  
Model No. F-431 Transport Package  
Certificate of Compliance No. 9310  
Revision No. 2

**SUMMARY**

By application dated July 16, 2004, MDS Nordion requested an amendment for the Certificate of Compliance (CoC) No. 9310, Model No. F-431 Transport Package. The U.S. Nuclear Regulatory Commission staff (staff) issued a request for additional information (RAI) by letter dated July 20, 2004. MDS Nordion responded to the RAI by submittal dated July 21, 2004. In review of the July 21, 2004, RAI response, the staff issued a RAI by letter dated July 22, 2004. MDS Nordion responded to the RAI by submittal dated July 23, 2004.

Based on the statements and representations in the application and supplement, the staff agrees that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

**EVALUATION**

By application dated July 16, 2004, as supplemented July 21 and July 23, 2004, MDS Nordion requested that Certificate of Compliance No. 9290, Model No. 430/GC-40 Transport Package, and Certificate of Compliance No. 9310, Model No. F-431 Transport Package, be amended to increase the bolt length from 3.5 inches to 4.0 inches in the tie-down collar of the package to ensure the proper thread engagement is maintained when the tie-down collar is assembled. Specifically, the currently approved collar bolts specifications, presented as Item 19 in drawing F643101-001, Rev. F, for the Model No. F-431 Transport Package, will now read "BOLT HEX HD 0.88-9 UNC-2A x 4.00 LG (MIN) ASTM A193 GR B8 CL 2 STRAIN HARDENED."

The staff agrees with the applicant's conclusion that the change of bolt length to 4.0 inches will not adversely affect the structural performance of the tie-down collar bolts.

**STRUCTURAL EVALUATION**

The tie-down collar, which seats on four bosses for the Model No. F-431, girdles the package at mid-height. It is composed of two equal weldment halves joined by mating flanges at two ends by two 7/8 inch diameter ASTM A193 Grade B8, Class 2 bolts at each joint. Because the steel bosses, which are welded to the overpack, serve to bear the vertical components of the tie-down forces, the SAR assumes that the collar bolts are only subject to the horizontal components of the tie-down forces. In the July 21, 2004, response to the staff's RAI dated July 20, 2004, the applicant provided two photo images documenting the as-built joint configuration for the F-430 overpack tie-down collar. The photos show a gap of 0.5 inches to 0.63 inches between the two 1-inch thick mating flanges. The photos also show that by adding the washer lock spring and the nut to the bolt engagement stack-up, the 4 inch long as-built bolt goes through the nut appreciably.

In MDS Nordion's July 23, 2004, RAI response to the staff's July 22, 2004, RAI, MDS Nordion provided further clarification for the bolt structural performance and noted that the original design as submitted February 20, 2003, included a gap between the mating flanges of the tie-down collar. An assessment of the F-430 overpack collar bolts, which bounds the Model No. F-431 tie-down application, demonstrated that the bolt shear and bending moment will result in negligibly small bolt stresses. For all four collar bolts acting together to resist a horizontal component of 19,620 lbs from the maximum tie-down chain load of 27,750 lbs, the applicant calculated a safety factor of 7 for the maximum bolt stress in tension.

The staff reviewed the assumptions made in the structural assessment and agrees with the large tensile stress safety factor calculated for the collar bolts. The staff further agrees with the applicant's conclusion that the change of bolt length to 4.0 inches will not adversely affect the structural performance of the tie-down collar bolts. This ensures that the tie-down collar bolts will continue to perform adequately to meet the requirements of 10 CFR 71.45(b)(1).

The following changes have been made to the CoC:

Condition No. 5(a)(3) of the certificate was changed from the previous drawing, F643101-001, Sheet 1, Revision E, to the revised drawing, F643101-001, Sheet 1, Revision F.

The July 16, July 21, and July 23, 2004, submittals were included in the Reference section.

## **CONCLUSION**

Based on the statements and representations in the application, the certificate has been issued with an expiration date of June 30, 2009. This change does not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9310, Revision No. 2  
on July 27, 2004.